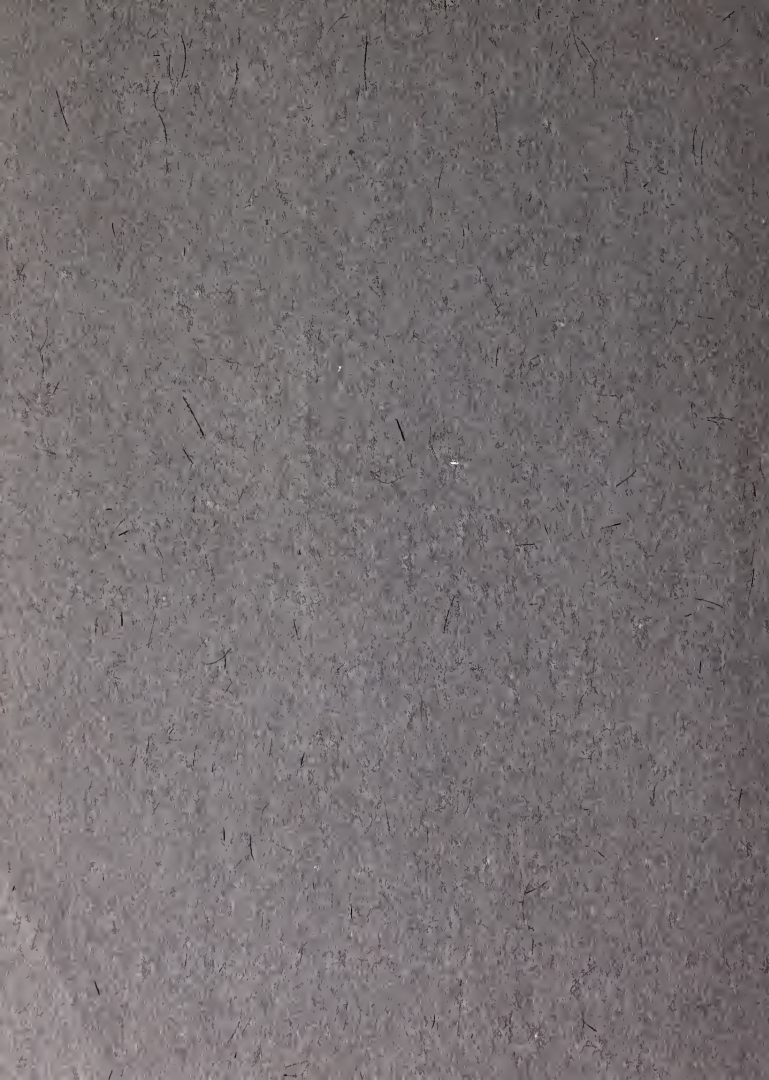




Modern Printing Processes

Gum-Bichromate
and Platinotype







From a
Gum Print

By
W. B. Dyer.

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Modern Printing Processes

Gum Bichromate and
Platinotype Papers

The Preparation, Printing and Developing of Gum Bichromate
Papers. The Manipulation of Platinotype Papers
by the aid of Glycerine and Bichloride
of Mercury, Etc.

BY

HENRY G. ABBOTT,

Author of Modern Photography in Theory and Practice, Progressive
Lessons in Photography, Etc.

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PREFACE.

As a rule, the painters of this and other countries are prejudiced against photography and they argue that it is simply a mechanical process and hence can never be recognized as Art. Their argument has always been that a work of art must possess a distinct individuality; that a mere copy of nature, a chunk of so many feet cut out from a landscape, just as it happened to appear to the man with the camera, is not Art, no matter how faithfully nature is copied. They hold that a person viewing a landscape does not see all of it with equal distinctness, and that the prominent object or objects, whether situated in the foreground or middle foreground, must be more prominent than the balance of the picture, and that right here is one of the great faults of photography; that the lens sees all parts of the view with equal clearness or sharpness, and that this sharpness is the chief detriment when the picture is viewed from an artistic standpoint. Knowing the sentiment of painters in regard to photography, and having carefully noted their criticisms, certain workers have revised their methods of focusing and exposure, so as to make the results conform more closely to the tastes of the critics; but even then the results

were not satisfactory, when ordinary printing-out papers, with extremely high finish, were employed in making the prints. Papers, then, which gave softer results, were looked for and the choice of such workers naturally fell upon platinotype and gum-bichromate papers, the former to be purchased from any dealer and the latter to be made by the photographer.

These papers were chosen because the operator could, by their use, put more or less of his individuality into his work, and the resultant print need not be a mere copy of nature. This is more largely true of gum-bichromate than of platinum prints, and, in fact, it may be said that no two gum-bichromate prints from the same negative are exactly alike. Given, then, a negative with any reasonable amount of artistic value in it and the worker can produce results in pictorial photography which certainly will pass for art with the public, providing he has ability in this line himself. The mere negative and paper will not of themselves produce artistic results any more than any other photographic process, and the operator to produce such results must have more or less artistic feeling.

The Philadelphia salons of 1898 and 1899, the Chicago Salon of 1900 and the various exhibits given at camera clubs, have done much towards educating amateur photographers to a higher standard and many who were content with glacé prints are now working the more artistic processes. The two

papers under discussion, together with carbon, are recognized the world over as the most permanent in their nature and the life of the print is limited only by the life of the stock which is coated. The only exception possible is the platinotype print which has been toned with bichloride of mercury or uranium. Uranium and mercury are unstaple commodities, and their actions vary greatly under different chemical conditions. Of the gum-bichromate print it may truthfully be said that it is as permanent as it is possible to have anything in photography, and the resulting print is nothing more or less than a water-color picture, produced semi-mechanically, there being nothing but pigment and paper.

With this brief summing up of the subject let us proceed to the practical side, starting with the gum-bichromate process.

H. G. A.



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The Gum-Bichromate Process.

It is quite essential that those who contemplate working the process should have at least a general knowledge of the principles underlying it, for there are few photographic processes which are so simple that they will work out their own conclusions, and this process is not one of them. To read over many of the hand books on the subject one would be led to believe that it is only necessary to mix together so much gum, pigment and bichromate, expose and then place the paper in cold water and nature does the rest. As a rule these books do not point out the failures and their remedies and they deal with the quantities in a very vague way, so that many who have tried the process and met with failure from the start, have given it up in despair.

The principle underlying the entire process is that many, if not all gums, when mixed with the bichromates and exposed fully to light, become insoluble, more or less, in cold water. This principle is taken advantage of by mixing certain pigments with the gum, which does not seem to effect the results, except in a limited way. The process is worked out in two different ways but the results are identical. The paper may be coated with a

mixture of gum, pigment and bichromate, or the paper may first be sensitized with the bichromate and a mixture of gum and pigment applied over it. The prepared paper is then dried in the dark and printed either in the sun or a good light, under an ordinary negative. The printing being completed, the paper is placed in a tray of cold water, say for ten or fifteen minutes, when that portion of the pigment which has not been affected in any degree by light will begin to melt or soften and run away in the water. The half-tones of the picture next dissolve slightly and thus give form to the picture. Those who have worked the carbon process will readily understand the action of the light and water, as the two processes are more or less similar. In the carbon process a heavier coating of pigment is given and the sensitizer is applied to the face of the pigment, so that a transfer is necessary in order to prevent the half-tones washing away. In the gum-bichromate process a light coating is given the paper and with care there is no danger of the important half-tones washing away and so no transfer is necessary. Some of the half-tones do wash away and are lost. The action of the light and water on the paper will be perhaps better understood by consulting the annexed figure.

By examining this figure it will be seen that if fully exposed, the pigmented surface will be printed

clear through to the paper on those portions which lie under the clear glass of the shadows and those portions which lie under the half-tones of the negative will be printed more or less through



the pigment, according as the light is allowed to penetrate through the developed film of the negative. Again glancing at the figure, we can readily see that if the coating on the paper be too heavy there will be great danger of the half-tones being undermined by the unexposed portions softening and washing away and the half-tones then having no support are also liable to collapse and be entirely destroyed by the water.

From this, then, we learn that a thin coating is quite necessary and this is a point which must be borne in mind, for it is just where fifty per cent of the failures occur.

Now as to the paper to be used. Almost any linen stock will answer, providing it is thick enough to handle while coating and washing and has a surface smooth enough to coat evenly. If the paper be too thin it will warp while coating and curl while drying and washing and give trouble generally and

for this reason a medium weight paper should be selected; if not a linen stock it is liable to tear, or, in fact, go to pieces in the water, for between developing and the final washing the print gets a pretty good soaking and only the best stock will stand it. What is known technically as a "laid" paper should be avoided, unless it is well calendered down, for with such papers it is very hard to get a nice, even coating and the consequence is you have a mottled print. A "laid" paper is one which, when held to the light, shows lines running in both directions. These lines are produced by the wires on which the paper is dried. If the paper has a very rough surface, as some water color and crayon papers have, then it should not be selected, for it will be readily seen that the pigment will collect in the depressions and an uneven coating result. Whatman's hot pressed, Steinbach's, Michallet, Lalanne, Julio and Allonge, are all reliable papers which are made for water color or charcoal sketching and will stand any amount of washing. Some are laid and some wove.

The fact that many who have attempted this process have selected a soft stock with little or no sizing is the reason of the many failures. If the paper be unsized the pigment will soak into the pores, and although the exposure may be a correct one, you will fail to wash out the pigment even by prolonged soaking. As a rule, the greater the sizing the more

contrast the print will have when finished. This fact may be taken advantage of in using various negatives.

As a general rule, you will make no mistake if you give your paper a sizing before coating, even if it be a sized paper, for it is better to be safe than sorry. The sizing may consist of a three per cent hot solution of arrowroot, a one to sixty solution of gelatine or a five per cent solution of gelatine mixed with a two per cent solution of chrome alum and applied hot. Or a five per cent solution of gelatine may first be applied and the sheet then passed through a ten per cent solution of formaline to harden it. An insoluble solution of gelatine is undoubtedly the best if we desire pure whites in our highlights. This sizing will also help materially in getting a nice, smooth coating, as many papers act greasy when the pigment is applied to them if not treated with a sizing bath.

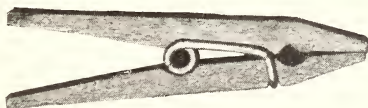
If a good linen stock is selected, such as Crane's, Parsons', Brown's, etc., a tinted paper can often be used to advantage and in this way a picture out of the ordinary may be secured. For example, a primrose paper may be selected and coated with a burnt umber, and the result will be a brown print on a very light brown background. A very light green paper coated with a dark green pigment is applicable for forest scenes, etc. By a judicious

selection of papers and pigments the worker may produce very artistic pictures which could not be produced by any other process.

Having selected our paper, let us proceed with the work.

The larger the sheet of paper the more difficult it is to handle it and for this reason it will be found easier and better to handle several small sheets rather than one large one. Cut your paper so as to leave at least a half inch all around ; that is to say, at least one inch larger each way than the finished print is to be. If you want to make prints from a 5x7 negative cut your paper to 6x8 or larger. This not only gives you an edge to handle the paper by, but it also gives you room to trim before printing, which is quite necessary, for the pigment gathers in coating at the edge, where it is generally thicker than in the middle. Secure a flat piece of board somewhat larger than your paper, a drawing board will do; cover it with a sheet of paper and sponge both sides of your sheet with water by means of a tuft of cotton or soft sponge. Do not apply enough water to make it run down the sheet, but merely enough to dampen. When you have dampened all the paper you are ready for the sizing, which should be applied hot. This can be done, if a small sheet, by pouring the size into a tray, immersing the sheet in it for a minute and then drawing it out over a glass

stiring rod in order to remove the surplus size. Care must be taken to break all air bubbles as soon as formed, otherwise the sizing will be uneven and will show in the finished print. It is also well to size both sides of the paper, so that either side can be coated at will. By immersing the sheet in the bath it will also prevent all curling and if the sheet is a heavy or medium weight it will hang out smoothly on the line. If a large sheet the sizing may be applied with a soft sponge or camels hair brush and if so desired only one side of the sheet may be sized, but in such a case the other should be



A Clip.

marked with a lead pencil so that the proper side be sensitized or coated. At this point it is well to note that gelatine, when treated with chrome alum, is nearly if not quite insoluble in hot water and it is well to mix these ingredients in some open vessel which can be readily cleaned out after use. The sizing being effected the sheets should be pinned up to a strip of wood or held in clips which are attached to a cord or rope. The clips will be found to be the most convenient and can afterwards be used for

drying the sensitized paper. The sizing should be thoroughly dry before the pigment is applied. The sheets can be hung in a kitchen or any other warm room and should dry in a half hour or less, depending, of course, on the temperature. The paper being thoroughly dry we are ready for the next operation.

As explained, there are two methods of using the sensitizing fluid; one by applying it to the paper and when dry coating with the gum and pigment, and the other to mix the sensitizer, gum and pigment and apply all at once. It matters little which method you adopt, though with the former a less exposure is required. We will describe both methods, starting with the one in which the paper is first sensitized.

The sensitizer may consist of a saturated solution of bichromate of potassium or equal parts of a saturated solution of bichromate of ammonium and bichromate of potassium. This solution is poured into a tray and a sheet of the paper floated upon it for a minute. Remove the sheet, break any air bells and immerse the sheet fully. Where the paper is sensitized before coating, the wrong side should be marked with a pencil, or otherwise each side will have to be inspected carefully. When the first sheet has been freed from air bells and immersed, follow with a second and so on until your tray will hold no more. Then lift the bottom sheet to the top,

again inspecting and breaking any air bells, and so on until the first sheet is again in the bottom of the tray. Allow the sheets to soak in the sensitizer for three or four minutes and then remove them, one at a time, by drawing them over a glass rod, and hang them up in clips to dry. Bichromate is poisonous and some skins are very susceptible to it and for this reason it is well to wear a set of rubber finger tips when sensitizing the sheets. The sensitizing can be done in a subdued light, but the drying should be done in the dark room.

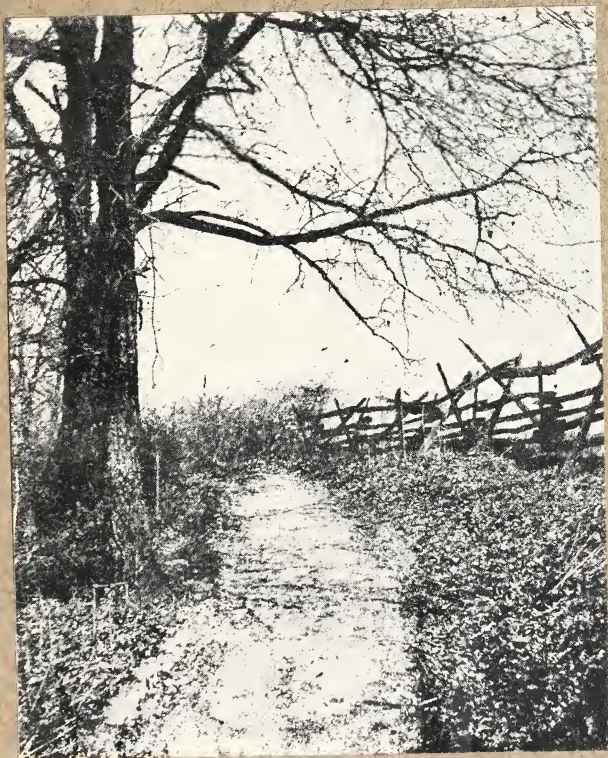
Drive a few tacks in the walls of the dark room, say seven or eight feet from the floor and stretch strings across from one tack to the other. As fast as your sheets are sensitized fasten the clips to them and hang the clips upon the string. The length of time to dry will depend upon the temperature of the dark room. Sensitized paper, if kept between blotters or in a book in the dark will keep for about six weeks, so that a supply of paper can be sensitized in one evening which will last for a month. Should occasion require it, paper may be sensitized, coated and printed all within a half hour. The writer has done this successfully many times and with good results, but the method cannot be recommended for general work. It can be effected as follows: Select a room having a yellow or colored curtain of a light shade, so you can see to work and yet the light is of

a color which will not affect the sensitive paper. The room should have a coal, gas or oil stove, in order to dry the paper. Sensitize as directed, place in clips and hang directly over the stove and the coating will be dry in five minutes or less. While the sensitive coating is drying prepare the pigment coat and when applied again hang over the stove and by the time the negative has been selected and placed in the printing frame the pigment will be dry and ready to print.

But to return to our sensitized sheets which are drying in the dark room.

If the sheets are sensitized in the evening they will be ready for the coating the next morning. Take them from the clips and pack them away in a plate box with a few blotters here and there between them. So long as the sensitized surface presents a brilliant yellow color, as it had when packed away, it is in good condition, but when the color has changed to a dirty green-brown the paper is no longer fit for use.

The pigment or color is the next thing to consider. This pigment is nothing more or less than a water color; or, in fact, fine charcoal may also be used. As a nice, smooth surface is indispensable to good work, it will be readily recognized that the color used must be carefully ground to free it from all lumps and gritty particles. The pigment may be

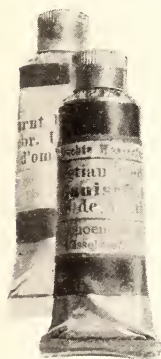


From a
Gum Print

By
Henry G. Abbott.



dry powder, moist colors in pans or tubes, or even solid cakes. Moist colors in tubes are the most convenient, although more expensive than dry or pan colors, yet they are, as a rule, thoroughly ground and no lumps or gritty portions will be found in them. If dry colors are used they will have to be thoroughly ground by means of a pestle and mortar or a glass muller and piece of plate glass, or



Moist Colors in Tubes.

lithographic stone will answer equally as well. If you grind your own pigment from dry colors it should be strained through a piece of fine muslin to remove any hard particles overlooked in grinding.

Any colors may be used, but the most desirable are burnt umber, Indian red, red ochre, sienna, venetian red, indigo and black. There are many shades which are perhaps as desirable which may be mixed, and there are other colors, like lemon yellow, umber, Vandyke brown, Prussian blue, sepia, etc., which do not answer very well by themselves, but which are very useful for mixing the various shades. I should advise the beginner to purchase chrome yellow, venetian red and Prussian blue, as with these colors he will be able to mix almost any shade he may desire. If charcoal is used,

considerable difficulty will be encountered and I should advise postponing its use until you are thoroughly acquainted with the process. As a rule, charcoal does not mix readily with the gum and water, and should be first ground into the gum and the mass thinned-afterwards with water to the right consistency. Too much grinding will be ruinous to the identity of the substance and we might just as well use black paint. The best way to use charcoal is to first sift it through bolting cloth or a fine sieve and then work it thoroughly into the gum as explained above.

A well calendered laid paper is the most preferable for use where charcoal is used as a pigment.

The next question for consideration is the colloid which is to be used. While there are a number of gums which when treated with bichromate and exposed to light become insoluble in water, yet there are none which are as satisfactory as gum arabic. Your druggist should be able to furnish you with this ingredient and if possible the gum which comes in the form of clear drops or beads, technically known as "tears," should be purchased. Such a gum you can depend upon as being pure, while the variety which comes in lump form may or may not be so. This gum will dissolve by means of water if kept in a warm place over night. To each ounce of gum add three ounces of cold water and when it has

thoroughly dissolved allow it to cool and then test it for density with the hydrometer. It should then be reduced with warm water to about 16° or 18° . It should then be filtered through a piece of muslin and a little boracic acid added to prevent it moulding. If the gum is of the common lump variety it is well to test it with litmus paper and if found to be distinctly acid it should be corrected by means of a drop or two of ammonia. The gum need not be neutral; a slight excess of acid will not be detrimental but too much is harmful.

Our sized and sensitized paper being ready, the pigment being selected and our gum prepared, let us proceed to coat our first sheet. Pour a little of the gum on a piece of plate glass, an old negative glass previously cleaned will answer, and squeeze a small quantity of the color from a tube upon the opposite corner of the glass and by means of a palette knife grind or work up some of the color with the gum to the consistency of cream. The exact consistency cannot be definitely stated because much depends on the pigment used, the darker shades requiring a thinner body than the lighter and more transparent ones. The consistency also depends on the paper to be coated. Soft, laid, crayon papers, like Julio and Michallet require a thinner pigment than the hard linen stock made by Brown and Crane. When the gum is thoroughly mixed with

the pigment the whole should be strained through a piece of muslin which has been previously wet and the surplus water squeezed out.

At this point it will be well to consider the brushes



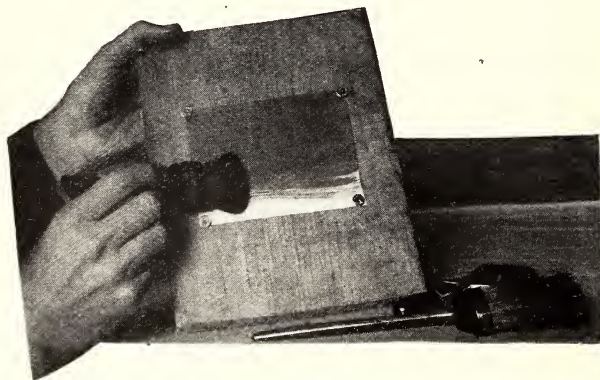
necessary in applying the pigment. At least two are requisite, a flat camel's hair brush for the application of the pigment and a blender made of badger hair for smoothing and blending down the ridges left by the brush. A two inch camel's hair will answer very well for all the smaller sizes of paper. This can be purchased for about 50 cents and a small round blender will cost you 75 cents. A better outfit, however, would consist of a two inch

camel's hair and two inch softener and a three inch flat blender. In the accompanying illustration No. 1 is a two and a half inch camel's hair, No. 2 a two inch softener, No. 3 a round blender and No. 4 a three inch flat blender.

The camel's hair brush should be well charged with the pigment, so that it will not be necessary to dip the brush a second time for a sheet $5\frac{1}{2} \times 8\frac{1}{2}$ or smaller. It should be tried first upon a piece of plain white paper to see how the color works and covers. It is well to first wet the brush and then squeeze the surplus water from it before putting it in the pigment. This will insure a more even coating than using a dry brush. The coating should just cover the paper and be so thin that the white paper will just barely reflect through it and the color no denser than the deepest shadows of the picture are to appear.

Take a drawing board or any other flat piece of soft wood a little larger than your sensitized sheet, spread over it a sheet of newspaper and lay your sensitized paper upon it, fastening it down at each corner by means of thumb tacks or strong pins. Fill the brush with the pigment and with light, even strokes, pass it over the paper, starting at the top of the sheet and gradually working towards the bottom, avoiding streaks of pigment as much as possible. The strokes should not overlap one an-

other but should join so as to have an even or nearly even coating. If the paper is not thoroughly covered turn the board and brush over at right angles to the direction in which you first brushed it. Now pass the softener over the sheet with light rapid strokes, starting at the top and working to the bottom. Then turn the board and soften lengthwise of the sheet. Now take the blender in your hand, holding it in a vertical position and pass it rapidly but lightly over the paper in both directions, paying particular attention to those portions which show streaks of color.



Coating the Paper.

All this will have to be done rapidly, much more rapidly than it takes to tell it, for the color dries very fast, and once it has set the blender will have no

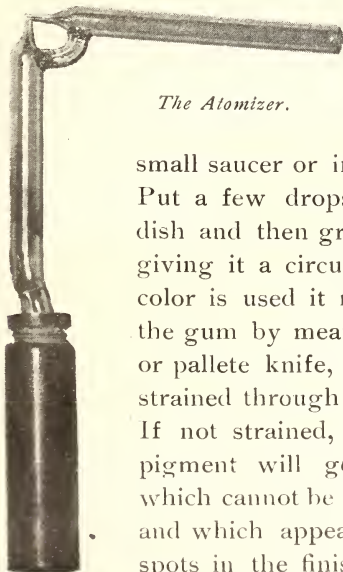
effect upon it. Your first efforts may not be satisfactory, and for that reason I should advise that you practice the coating on some ordinary writing paper.



The Palette Knife.

With a little practice you will be able to spread the pigment quite evenly and the softener and blender

will remove any faulty streaks.



The Atomizer.

If you use cake colors it is well to grind them in a

small saucer or individual butter dish. Put a few drops of the gum in the dish and then grind the cake in it by giving it a circular motion. If dry color is used it must be ground with the gum by means of a glass muller or palette knife, and must always be strained through muslin before using. If not strained, little hard lumps of pigment will get into the coating, which cannot be successfully removed and which appear in white or colored spots in the finished print, depending on whether they stick or are washed

away. Another method is to coat the paper by means of an atomizer. The atomizer consists of two glass tubes placed at right angles to each other. One tube is placed in a small vial containing the mixture of gum water and color and the other is placed in the mouth. By blowing in the tube a fine spray of the liquid color is diffused over the paper, and by moving the atomizer up and down and from side to side the sheet can be, with a little practice, very evenly coated. A very little blending will be required after you become expert with the atomizer. The tin atomizers used for spraying charcoal and crayon drawings are not satisfactory as they do not produce a fine enough spray.

The paper being coated successfully is placed in clips and hung upon the lines in the dark room to dry. In the event that you wish to coat with the pigment sensitized, proceed as follows: Mix together equal parts of the gum solution and the saturated bichromate solution in a small saucer, and to this add the moist or dry color as described above. The coating is applied to the paper just as in the case of the sensitized paper. At a glance this will appear to be the simplest and quickest method, as the previous sensitizing of the paper is done away with, but the result is a paper which is less sensitive. The results are as good in one case as another, so it matters little which practice you may follow.

Now all this may seem quite tedious and complicated to those who have never worked the process, and yet, as a matter of fact, there is no more, if as much work involved, as in completing a picture on printing-out paper.

In regard to the negatives to be selected for this process, I would say that every negative will not give pleasing results, and this might just as well be understood from the start. A negative which is dependent upon details for its beauty will not be an appropriate one. This does not mean that only negatives which are fuzzy or apparently out of focus should be used. It means that any negative may be used ; but as the paper does not reproduce the very fine details any negative which is dependent very largely on these details to procure a picture will, if printed in this process, probably be disappointing.

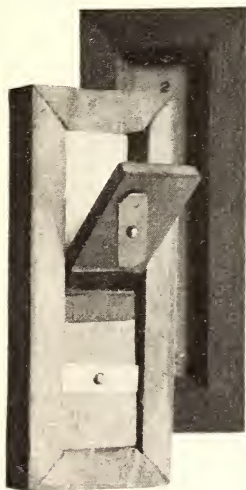
Very thin negatives do not produce desirable results in this process. On the whole the negative which will give the most pleasing result is one which might be termed a strong negative ; a negative with considerable contrast, not over-burdened with innumerable small details. Among portraits, those which portray the face rather than the clothing ; busts and heads rather than half-length and full-length figures, are the most appropriate. In landscapes, those which depict a single object and subject all others, as a tree or rock, and particularly when the tree is

devoid of foliage, give the most pleasing results. A negative which will produce satisfactory results on any rough developing paper will, as a usual thing, produce a pleasing print in gum-bichromate. The two prints, when compared side by side, will not be at all alike, but yet the gum-bichromate picture will be if anything far more artistic of the two. Negatives that are too contrasty, too full of extreme lights and clear glass shadows, will be found as unfitting as those which are flat. A good even negative, inclined to be soft, with gradual shadings, will be the most satisfactory. Under all circumstances I should recommend that you varnish the negatives you propose to use for the gum-bichromate process, providing you place any great value upon them. This should be done for two reasons, first, there is a very slight possibility that your paper may not at all times be thoroughly dry before printing, though it should be, and therefore sticks to the face of the negative; and second, the pigment face of the paper is inclined to be more or less gritty and has a tendency to scratch the film if carelessly handled.

Now a few words in regard to exposure, development and fixing.

As in any other printing process, the duration of exposure will depend largely on the strength of the light and the kind of negative used. Roughly stated, gum-bichromate paper will print in about the same

time that any ordinary printing-out paper will. An ordinary negative will print, say, in three minutes in the sun on a bright day. It will not do, however, to guess at it, for much depends on the length of



The Actinometer Back and Front.

the printing, for if we print too deep the pigment may refuse to leave the paper and if we print too little the image may wash away entirely. To print intelligently you must either use an actinometer or place another negative similar to the one you wish to use in a frame beside it, using a printing-out paper as a guide. When the printing-out paper, say Solio, is printed to the proper depth for toning, then your gum-bichromate paper will be very nearly printed correctly. It may want a little more or a little less,

depending on the color used. A few experiments will determine the right exposure. The actinometer is a simple instrument used for comparative timing. See the accompanying illustration. It is very similar to an ordinary printing frame on a small scale

except that a piece of glass with from one to fifteen thicknesses of tissue paper pasted upon it takes the place of the negative. The strips of tissue are numbered according to the number of layers, from one to fifteen. A strip of printing-out paper is placed in the frame and the actinometer is placed beside the frame containing the gum-bichromate paper. When the paper under the sixth or seventh strip of the actinometer has printed to a deep cherry a bichromate print from an ordinary negative will be sufficiently printed. A few trials, at least, will determine the proper depth to print. When you have found this depth the negative envelope should be marked, say, "Gum-Bichromate 6," and if at any other time you should desire to make a gum print from the negative you can strike the proper exposure at once by consulting the envelope. The exposure given above applies to paper which is first sensitized and then coated, but if the sensitizer be mixed with the gum and pigment, then, as a rule, a longer exposure will be necessary; say print to number ten for the first trial.

It will be readily seen that the length of exposure is largely governed by the amount of sensitizer which the coating contains. It is therefore wise to always use a definite proportion of sensitizer, and if the colloided pigment requires thinning, to do it with water and not with the sensitizing fluid. The same

is true of the gum water. Always use a definite proportion. I find that the reds and browns require a little longer exposure than other colors, not even excepting black. The thickness of the coating on the paper also affects the length of the exposure materially, as it takes much longer for the light to penetrate through a thick than a thin coating. Before proceeding further with the question of exposure I desire to explain the method of development, since in this way the reader will better understand what is required.

The development, so-called, is not truly a development but is a washing-out process, since the water simply removes those portions of the pigment which have not been hardened by the action of light. The removal of this unaffected pigment may be secured in various ways. If the negative is perfectly satisfactory and you wish a print similar in general details to an ordinary print made from the same negative, then if the proper exposure be given the print will develop out entirely in ordinary cool water. The print is placed in a tray of water face downward and allowed to remain for ten minutes. At the end of this time turn it over carefully, grasping the paper at the corners, and examine the face of it. If the exposure was a correct one you will generally find that a slight image is visible, that is, the pigment that lay under the highlights has softened and

run away in the water. If you use a mask in printing you will find that the pigment that lay under the mask shows a tendency to soften and run away. If, on the other hand, there appears to be no tendency to soften, then turn the print face down again and allow it to soak for another ten minutes. Now



Developing the Print.

turn it face up and again examine. If it shows any signs of softening at the edges place it on a piece of zinc or plate glass, hold it in position by means of a clip and gently bathe it with the cold water by pouring it from a graduate or other vessel. Do not pour the water directly on the print but let it strike the glass above the paper and flow over the print in a gentle stream. This will usually remove

the greater part of the pigment from the highlights and half-tones ; but should it prove a little obstinate in places then pour the water directly on these places. If after a print has soaked for a half hour in cold water there is no sign of softening, then fill the tray with warm water and again allow it to soak. If this means has to be resorted to then you know that it has been over printed and you may have to soak the print for hours or perhaps days. If you are in doubt at all about the paper or the pigment you should soak a small piece of the pigmented paper which has not been exposed to light. At the end of fifteen minutes soaking the pigment should leave the paper easily upon bathing it with water. If it does not, then the trouble may be that there is too much gum in your coating or the paper was not properly sized, or the gum has acidified, and in the latter case it should be tested with litmus paper and a few drops of ammonia added to it to make it neutral. Again, you may find that the coating softens and comes away easily after soaking an unexposed piece of the paper, and that after exposing under the negative it does the same thing, but no image, or only a partial image, appears. This is an indication that your coating is weak in sensitizer if a combined coating is used, or that your sensitizing solution was weak or the paper not soaked in it long enough, if the paper be sensitized prior to coating.

If the edges of the print soften after coating and the highlights appear rapidly, followed almost instantly by the half-tones, then the print was under-exposed, and great care will have to be exercised to prevent the water from washing away the whole print. If slightly over-printed the dish containing the print can be rocked back and forth or the print drawn through the water if the tray be large enough to admit of it. If it is still further over-printed the water may be changed to warm, say 85° , and the process repeated; or the print may be fastened to the glass and warm water poured over it or warm water mixed with fine boxwood sawdust. The sawdust acts as a brush and helps to remove the superfluous pigment. In very obstinate cases the blender may be passed lightly over the face of the entire print while wet, and this often starts the coating so that it will continue to dissolve by the application of warm water. If this fails add a small quantity of ammonia to the wash water and try again.

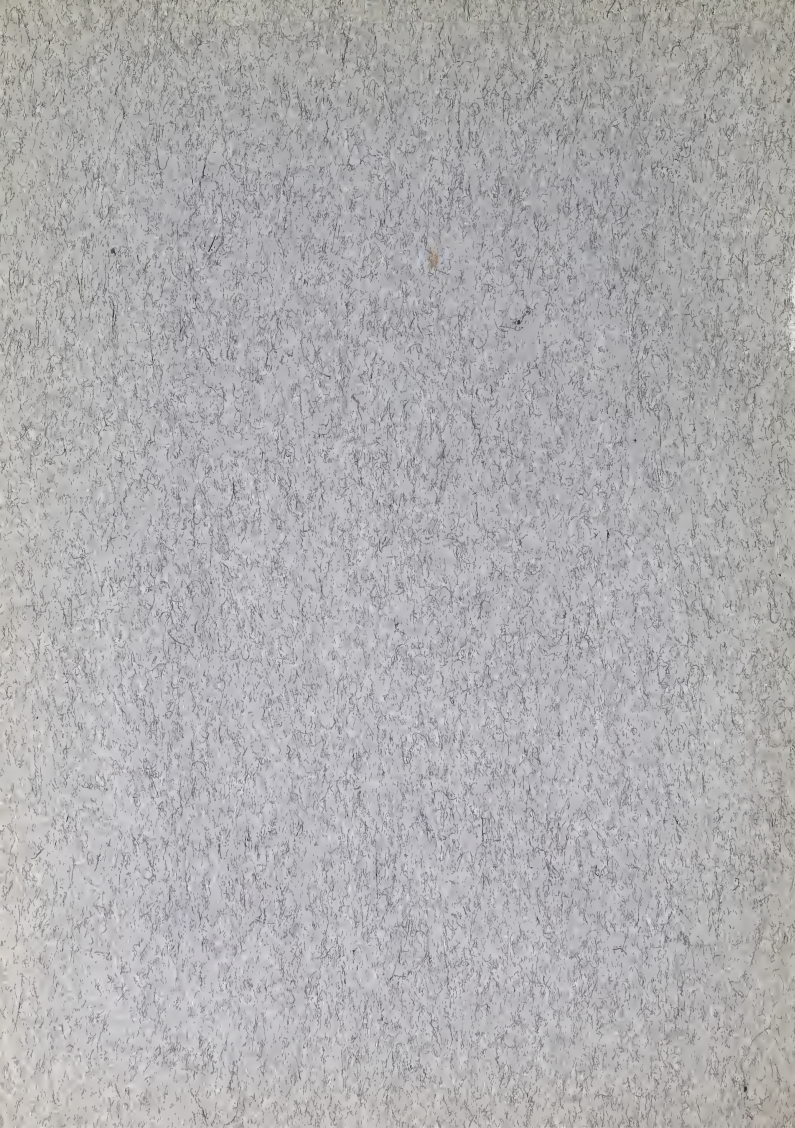
It is always well to first make a print from the negative on ordinary printing-out paper, as this print will prove useful to you when working the gum-bichromate process. It will show you just where the highlights are that you wish to work on and where the shadows are located which you do not want to disturb.

Should you wish to modify your print from the



From a
Gum Print

By
F. K. Lawrence.



results you would get from a mechanically developed print, then the exposure and treatment will have to be somewhat different. The exposure in such cases should be longer than normal. Over exposure allows manipulation with sawdust and brush, which a normally exposed print could not withstand, and such a print is usually softer and of a different grain. To modify your print you may first pass lightly over it with the blender, keeping it well covered with water. Now by comparing your solio print with the one in hand you can locate the highlights of your picture and pay special attention to them either by means of the sawdust stream or a soft camels hair brush. Having worked these out to your satisfaction you next give your attention to the half-tones. It may be that if the negative is a trifle flat you may wish to add strength to the highlights, and this may be effected by the use of a fine-pointed camels hair brush, which when lightly applied to the parts readily loosens up the coating and it flows away. Extreme care must be exercised at this kind of work or you may remove very much more than you intended, for the coating is extremely delicate while wet and the least touch severs it from the paper. Demachy uses a coating of glycerine when manipulating prints to any extent. The glycerine is brushed over the face of the print and acts as a cushion to prevent the individual hairs

of the brush leaving marks upon the face of the print.

While it is quite possible to print in the sky from one negative and the foreground from another, yet it is much easier to get your sky effect by manipulation. Should your negative be solid black in the sky, thus protecting the coated surface of the paper so that the coating softens and runs away when soaking, it may be easily obviated by sunning. Hold a piece of card or black paper over the previously printed paper, exposing the sky portion to the action of the sun for a few moments, and the sky will then be printed deep enough to withstand considerable friction of the brush. The card should not be held stationary, but moved up and down, so that there will be no harsh line at the horizon. Now by means of a broad brush you can easily work in a good sky effect. In order to determine the horizon line on the print, take both print and negative from the printing frame and with a lead pencil make marks on the edges of the print at the horizon line. In sunning, either the foreground must be covered entirely by means of a card or black paper or else a card large enough to cover the entire print must be used, for otherwise the foreground would be set by the action of the light and your print ruined.

The print having been developed to your satis-

faction is removed from the tray of water or sheet of glass, as the case may be, and is hung up in a clip to dry. When it is thoroughly dry it is then treated to a bath of bisulphate of soda and water. A five per cent solution has been found sufficiently strong for the purpose. A two per cent solution of alum or a five per cent solution of hypo may also be used for fixing. These baths not only harden the pigment but dissolve and remove any surplus of bichromate that may remain, and the paper comes out as clean as before treatment.

If the dull surface is satisfactory then your print is ready to mount, but it may be brightened up and improved greatly by spraying it with a solution such as is used for fixing crayons, pastel and charcoal drawings, which consists of one dram of mastic varnish to six drams of ninety per cent alcohol. The spraying is applied by meant of the atomizer referred to for coating the paper. Before fixing and spraying, however, all defects should be touched up in the following manner :

Should you have removed by accident the pigment from any part of the print, leaving an undesirable white spot, or should there have been a hole in the negative, printing in a dark spot which you have intentionally removed, then these spots can be filled in by mixing up a little of the color with the bichromate and gum solution to the proper shade

and applying it with a small brush. In fact, a solid background of an entirely different color can be painted in. The print must then be exposed to the light for a few minutes in order to harden the pigment, washed slightly and then fixed. Another method is to spot after fixing and washing and before spraying. This is done with the water color, mixed with water only, to the proper shade, the spraying compound being relied upon to hold it securely in place.

Highlights and halftones may be strengthened by the judicious use of a rubber eraser. The rubber should be pared to a point and the work done on the dry print prior to fixing and spraying.

Prof. R. Namias, after a long series of experiments, has worked out a very ingenious method of securing various colored images on a bichromated sheet without the aid of a pigment. The process is based on the fact that bichromated gelatine loses the property of absorbing certain saline solutions after exposure to light for a certain length of time. The paper is first coated with insoluble gelatine and when this is dry is coated with gelatine sensitized with bichromate of potassium. The paper is exposed under a negative for, say, three minutes in sunlight, and is then washed in water until nearly all traces of the color have left the sheet. It is then soaked for fifteen minutes in the First Saline Solution, and

FIRST SOLUTION.	SECOND SOLUTION.	COLOR PRODUCED.
Chloride of Barium.	Sulphate of Soda.	White.
Nitrate of Uranium.	Ferrocyanide of Potassium.	Dark Red.
Sulphate of Copper.	Ferrocyanide of potassium.	Light Red.
Chloride of Iron.	Ferrocyanide of Potassium.	Blue.
Chloride of Cadmium.	Sulphide of Soda.	Yellow.
Acetate of Lead.	Sulphide of Soda.	Black.

without washing it is placed in the Second Solution, which reacts on the first and causes a colored precipitate. A five to ten per cent solution of the salts is found to be the best.



Printing and Toning Platinotype Papers.

Platinotype papers are of two types, those which yield a full and those which yield a partial image. Etching Matte belongs to the former type while Willis & Clements', Bradley's, Millen & Wallace's and the Western belong to the latter. Those papers which yield a partial image are known as developing papers, and while there are two kinds, the hot and the cold developing, yet the hot developing variety is so little handled in this country that we shall devote our entire attention to the cold developing type.

The advantages of platinotype papers are many. A print when properly toned is absolutely permanent; the various surfaces of stock make it applicable to any variety of negative, and its capability of being modified in development allows the worker to put into the print those little individualities so much to be desired. With a thorough knowledge of the subject a great variety of prints may be made from the same negative. An almost endless variety of tones can be secured, ranging from black, through the browns and sepias to red. Green and blue tones in whole or in part may also be secured by manipulation.

Platinotype papers are usually made in "Thin Smooth," "Heavy Smooth" and "Heavy Rough." Select the paper which is most appropriate to the negative in hand. These papers are very susceptible to dampness and are therefore to be kept in a cool but dry place. The printing frames should be thoroughly dried in front of a fire or in the sun before using, especially if they be stored in a dark room which is located in a damp place like a basement. A few soft blotters should be cut to the size of the negative and at least two blotters should be laid upon the back of the paper before putting the back of the frame into position. The blotters will have a tendency to absorb any excess of moisture, and where the heavy rough papers are used will also be useful in bringing the paper into close contact with the negative.

The paper before exposure is of a lemon color and the fully-printed image is brownish-gray. The accompanying illustration will give a good idea of the appearance of a print before and after development. Among beginners there is a tendency to over rather than under print. It will be well for the beginner to experiment a little by tearing a sheet into three or four strips and developing these strips as soon as printed. He will very soon learn the proper depth to which printing should be carried. Where the printed sheet before developing shows a smudge or



Appearance of a platinotype print before development.



Appearance of a platinotype print after development.

smear in the solids or shadows it is an indication of over-printing. Most papers come in tin tubes, and in the center will be found a piece of calcium chloride wrapped in paper. As fast as the prints are made they should be returned to the tube, where they will be kept dry until ready to develop. It is advisable to develop as soon as you are through printing a batch, or if you are not certain of your exposures it is perhaps better to develop one or two at a time as fast as printed.

While the printing can be done in the sun and it is quite convenient to do so in the winter when the light is inclined to be weak, yet printing carried on in the shade gives prints which are more contrasty and snappy than those printed directly in the sunlight. As a rule, weak, thin negatives will give better prints if a piece of blue glass be placed in front of the negative. This blue glass should not be inserted in the printing frame but held in front of the negative, say two inches, for if placed directly against the negative any imperfections in the glass, such as bubbles, will show clearly on the print. The blue glass can be supported by placing it in a slit made in a small piece of board. A piece of one inch pine board six inches wide and twelve inches long will prove handy. At one end of the board several slits should be made by means of a saw, the slits being at various angles, so the blue glass may

face the sun at almost any time of day at which you may be printing during the winter. If used in the shade it will not matter what angle the blue glass is placed, providing the printing frame back of it is at the same angle.

Where a number of prints are to be made from one negative uniformity of results is desirable, and in such a case it would be better to print by the aid of an actinometer as in gum-bichromate printing. Where single prints are made from a negative it will be found much easier to dispense with the actinometer and rely on your judgment and the appearance of the printed paper in the frame.

While the depth of printing has much to do with the appearance of the finished print, yet development is the important point of the process, and it is here that the individuality of the worker comes into play. The different manufacturers supply developing salts to be used with their paper, but as a rule workers use a developer consisting of oxalate of potash and water. A saturated solution is made by dissolving one ounce of pure oxalate of potash in three ounces of distilled water. As the oxalate dissolves very slowly it is better to make up a stock solution and keep it in a glass stoppered bottle rather than to make up fresh developer each time you print. This bottle should be labeled "Stock Solution Oxalate."

Ordinarily this solution is diluted more or less, according as the print to be developed is over or under printed or the proper exposure given. A much better method of working, however, is to have a developing bath which is fitted for an over-exposed print, develop the whole print in it and then bring up the weaker portions or the whole print, if necessary, in a stronger solution, which is kept in a cup, and applied by means of a camels hair brush. The method will save many prints which would otherwise develop so rapidly that the operator loses all control over them and they are over-developed before they can be placed in the clearing solution. This treatment will not, however, save a grossly over-exposed print, one which has been allowed to print until muddy streaks appear in the shadows. These patches are known as "bronzing," not that they bronze, but because the prints are on a par, as regards depth of printing, with a printing-out paper which has been carried so far that the shadows bronze.

To prepare for developing it is necessary to have a glass or rubber tray somewhat larger than the prints, a piece of plate glass of the size of the print or larger, a cup and two small brushes, camels hair or sable, one a half inch and the other a pencil brush. Mix the following solution for the tray :

Stock Solution Oxalate.....1 oz.
Water.....2 oz.
Glycerine, pure.....1 oz.

The glycerine should be pure, otherwise there is a liability to stain and produce granular prints. In the cup place

Stock Solution Oxalate..... $\frac{1}{2}$ oz.
Water.....1 oz.

Place the print in the tray or draw it through the solution once or twice, being careful to break any air bells that may form, and hold it on the hand and watch development. The print will develop slowly and evenly and you will have plenty of time to note whether there are any weak spots that do not come up as strongly as the other portions. If you find such, or if the entire print is somewhat weak, then place it upon the piece of plate glass and apply the stronger developer in the cup, either locally or over the entire surface, as the case would seem to demand. For local treatment use the small brush and for the whole print the larger brush. If the print appears to be under exposed and does not respond to this treatment, then it may be held before the fire, oil or gas stove, or even gas flame, and moved two and fro, so that the entire surface is heated. Under this action a decided change will take place and the print should be watched carefully, and when the develop-

ment has reached the proper stage should be immediately plunged in the clearing bath.

The oxalate formula given produces normal black tones, but where more decided or intense black tones are wanted the following stock solution may be prepared ;

Oxalate of Potash.....	1 Part.
Potassium Phosphate.....	$\frac{1}{2}$ Part.
Water.....	9 Parts.

Label the bottle "Intense Black Stock Solution Oxalate." To use take

Intense Black Solution.....	1 oz.
Water.....	1 oz.
Glycerine.....	1 oz.

The potassium phosphate is somewhat hard to secure in a pure state and sodium phosphate is used in its stead, but the potassium is to be preferred. After using these developers once they may be saved and placed in glass stoppered bottles marked "Old Platinum Developer," but as their action is uncertain after being kept for any length of time, and as the ingredients are cheap, it will be much more economical to throw them away after use and start with new developer, especially where considerable length of time elapses between developments. Before taking up the other methods of development it is well to consider the fixing baths.

The fixing and clearing of the print is performed in one operation, and the bath consists of

Pure Muriatic Acid.....	1 oz.
Water.....	60 ozs.

The ordinary commercial acid is very liable to produce yellow prints and the pure acid only should be used. Three or even four enameled iron pans should be used and as many baths made up. The fully developed print is placed in the first bath, and after remaining for ten minutes is passed to the second, where it remains for the same length of time, and and then to the third, etc. The baths should be rocked or the prints moved around in them so that the acidulated water has full access to each print. These baths should be examined from time to time, especially if a large number of prints are being developed, and as soon as they begin to show a yellow tinge they should be thrown away and a new bath prepared. The first tray usually shows the color first, it being the iron which is washed out of the coating. The prints begin to lose their yellow color soon after placing them in the bath and the white paper appears. Should baths charged with iron be continued the prints will be liable to be charged, and the result will be a disagreeable color and liability to fade. After passing through the clearing baths the prints should be washed for at least twenty minutes, and a longer washing will do no harm.

It often happens that a print is weak and intensification is desirable. This may be accomplished in a number of ways, but the following are the most reliable. Make up two solutions as follows :

- | | | | |
|--------|---|-------------------------|---------|
| No. 1. | { | Sodium Formate..... | 50 grs. |
| | | Water..... | 1 oz. |
| No. 2. | { | Platinum Perchloride... | 10 grs. |
| | | Water..... | 1 oz. |

To 2 ounces of pure water add 15 minims of No. 1 and 15 minims of No. 2. The print is to be soaked in the solution from fifteen to forty-five minutes, depending on the amount of intensification required. It is then washed for a half hour and dried. The print should be intensified as soon as washed, but dried prints may be intensified if not too old by previously soaking in cold water for fifteen minutes.

Dolland's method of intensifying platinum prints is to prepare the following solutions :

- | | | | |
|--------|---|-------------------------|---------|
| No. 1. | { | Gold Chl ride..... | 15 grs. |
| | | Water..... | 7½ drs. |
| No. 2. | { | Pure Glycerine..... | q. s. |
| No. 3. | { | Sodium Sulphite..... | 1 oz. |
| | | Water to..... | 10 oz. |
| | | Metol..... | 50 grs. |
| No. 4. | { | Potassium Carbonate.... | 1 oz. |
| | | Water to..... | 10 oz. |

The print to be intensified is soaked in water for a few minutes, placed on a sheet of plate glass and then

coated with the glycerine by means of a brush. Solution No. 1 is neutralized with a little chalk or carbonate of soda, and then one drop of muriatic acid is added. This solution is then applied to the face of the print by means of a broad camel's hair brush. The face of the print must be entirely covered with the solution and the brush kept in motion so that the gold solution covers every part thoroughly. The print will gradually darken, and when the proper color has been reached it should be slightly washed and then brushed, both on the face and on the back, with equal parts of solutions Nos. 3 and 4 mixed. The operation is completed by washing the print in running water for thirty minutes.

There is no reliable method of reducing black platinum prints, and for this reason the worker should be careful not to over-print. However, in spite of all precautions over-printing and over-developing will occasionally occur, and such prints should not be thrown away, for although we cannot reduce them in the form of black prints, still we can change their color to sepia and then reduce them. This will be fully explained later on.

There is another method of developing platino-types which will appeal very strongly to those who wish to individualize their work or who wish to make changes in the print. This is known as Local Development with Glycerine. We have learned

that glycerine has a retarding action upon development, and this fact is taken advantage of in this process to a considerable extent. The print to be manipulated is placed upon a sheet of plate glass which has previously been brushed with glycerine. The face of the print is now covered thoroughly with a coat of glycerine by pouring it upon the paper and spreading with the brush. Allow the glycerine to soak in for some minutes while you are preparing the developer. The printing should be a trifle deeper than for ordinary development. Four small cups or other vessels should be provided, and aside from the large brush used for spreading the glycerine at least two others will be required, one, say a quarter inch in diameter and the other a fine pointed brush such as is used for spotting out. In the cups place the following ingredients :

First Cup.....	Pure Glycerine.
Second Cup.	{ Glycerine.....1 Part.
	{ Stock Solution Oxalate...1 Part.
	{ Water.....3 Parts.
Third Cup.	{ Glycerine.....1 Part.
	{ Stock Solution Oxalate...2 Parts.
	{ Water.....2 Parts.
Fourth Cup.	{ Glycerine.....1 Part.
	{ Stock Solution Oxalate...2 parts.
	{ Water.....1 Part.

A number of small squares of blotter will be very necessary, for with them you can take up the sur-

plus developer and thus stop development at any point you wish. This will be more fully explained later on.

Now suppose you have a portrait of a child, a head, and you wish to eliminate the background entirely and vignette away the body just below the shoulders, as shown in the illustration on the opposite page. It is desirable that you have a silver or other print made from the same negative at hand in order that you may determine just what portions you will cut out and just how you will manipulate the balance of the print. Examine the print which has been covered with glycerine and with a small piece of blotter dry the surface of those portions which you propose to work upon and cover with a good coat of glycerine the parts to be eliminated. Dip a brush in the second cup, and after squeezing out the surplus developer with the fingers apply it to those portions of the picture which it is desired to bring up first, say the delicate half-tones of the face. When the proper stage of development has been reached blot up the developer on that part and with the glycerine brush cover it with a light coating of glycerine. The fact that the developer remaining on the surface has been removed by the blotter and the glycerine of itself is a restrainer, retards all, or nearly all, development in this particular spot and you can now develop up the other portions of the



From a
Platinotype

By
W. B. Dyer.

An Example of Local Development with Brush and the use
of Mercury for securing Flesh Tints.



From a
Platinotype

By
W. B. Dyer.

An Example of Regular Toning in Platinotype. By comparing this with the figure on the other side you will see how the print was manipulated to cut out background and dress.

picture. The developer in the third cup would naturally be used for the lesser shadows and that in the fourth cup for the more substantial ones. You will note that where you draw the brush the print develops up, and if the surplus developer has been removed from the brush you can confine the development very readily to the certain portions you are working on. This being the case, you can if you desire produce a print which strongly resembles a black and white water color or wash drawing.

Another method is to blot off the glycerine from all portions which you wish to develop up, apply the weak developer in the second cup to all these portions and then bring up the lesser and greater shadows by applying the developer in cups three and four. This method, on the whole, is the better for the worker who has had no experience in the glycerine method of development, as there is less danger of leaving undeveloped or partly developed portions where one development ended and the other began. Such streaks are ruinous to a print, and it is very difficult, if not impossible, to bring up these portions separately to the required tone. The worker will get a very good idea of the possibilities of this method if he will take a small negative or use a portion of a large one and make, say, three prints from it and then proceed to develop them as above outlined. He will probably find that he has three en-

tirely different pictures, so different that at a glance they would seem to have been made from three different negatives.

Very beautiful effects both in landscapes and portraits may be secured by what is known as double toning, *i. e.*, toning portions of the print a flesh or sepia color and the balance toned black, as in the illustration on page 53. This double toning may be effected in various ways by the use of bichloride and chloride of mercury. The mercury solution is to consist of either chloride or bichloride of mercury, 1 part to 20 parts of water. A Stock Solution of Mercury Developer is made as follows :

Mercury Solution (1 to 20)..... 1 oz.
 Stock Solution Oxalate (1 to 3)..... 8 oz.

For this process the following will be required : Four small cups, three or four brushes of various sizes, depending on the nature of the work in hand, and some small pieces of soft blotting paper. The cups are used as follows :

	Cup No. 1.....	Glycerine.
Cup No. 2.	{	Glycerine..... 1 part.
	{	Mercury Developer..... 1 part.
	{	Water..... 3 parts.
Cup No. 3.	{	Glycerine..... 1 part.
	{	Mercury Developer..... 2 parts.
	{	Water..... 2 parts.
Cup No. 4.	{	Glycerine..... 1 part.
	{	Mercury Developer..... 2 parts.
	{	Water..... 1 part.

The solution in cup No. 4 might be called a normal developer, as it is the one which is used the most. The platinotype paper is printed a little deeper than for ordinary black tones. A silver print is made for comparison and the platinum print laid on glass and covered with glycerine as in the previous method. Take for example the head and shoulders of the a child, as shown on page 53. The glycerine is blotted away from those portions of the face which you wish to have appear with a flesh tone. A brush is dipped in cup No. 2 and the surplus developer removed from the brush by passing it through the fingers. It will be advisable to use rubber finger tips, for the mercury is poisonous, and while it will not affect some persons' fingers in other cases it attacks the skin and causes considerable annoyance. The same is true of uranium baths, which will be described later on. The brush being freed from the surplus developer is passed lightly over the face back and forth, covering the surface thoroughly without allowing the developer to flow beyond the portions which you wish tinted. The image will come up gradually, and when it has reached the desired tone should be blotted off with a piece of clean blotter and the parts covered with glycerine. You can now examine your print and determine what the balance of the treatment shall be. The operation should, of course, be carried on in a weak

light or by gaslight, the same as in developing the black image.

The balance of the picture, if to be black, can be toned in two ways. The print can be placed directly in a tray containing the regular oxalate or intense black solution as preferred, or the black development may be brought up by means of the brush, as in Local Development, eliminating those details which are objectionable. The operator must be careful to throw away the blotters as fast as they have been used, otherwise, if used a second time the mercury developer may be transferred to the black surface and leave an ugly stain. The brushes used for mercury development should never be used for the black solutions, and should be marked so no mistake of this kind will happen. The cups, too, should be thoroughly washed in boiling water after use. If the print be transferred to the oxalate solution the black image will appear on every portion of the print except that which has been developed with the mercury, and the result will be a print in two tones or colors. The strong acid baths will affect the mercury toning more or less and it is advisable to use a clearing bath consisting of

Muriatic Acid.....	1 oz.
Water.....	200 oz.

In these baths the prints can remain the ordi-

nary length of time, say ten minutes each, and are thus thoroughly washed.

Should your mercury tone be too light after clearing and washing, it can be readily changed or intensified by placing the print in a bath of uranium made as follows :

Uranium Nitrate, 10 per cent solution.....	1 dr.
Ferricyanide of Potassium, 10 per cent solution...	1 dr.
Water.....	6 oz.
Acetic Acid.....	20 drops.

Note, that in using mercury the tone is governed by the amount of mercury in the solution and not by the length of time the print is acted upon. The tone can therefore be changed, within certain prescribed limits, by using more or less mercury. With the oxalate developer the tone depends on two factors, the strength of the developer and length of development. With the uranium developer the tone darkens according to the length of development. Should the uranium toning be too deep to suit you it can easily be reduced by applying a weak solution of carbonate of soda to the print by means of a tuft of cotton. After this reduction has reached the proper stage place the print in water at once to stop the reduction.

Let us now consider some methods of producing sepia, brown and other colored effects on black platinotype papers. While a special paper can be

purchased which will produce sepia tones, yet this paper produces only these tones, and by the methods to be described the worker can produce almost any shade or tone at will, and if the shade is not satisfactory it can be intensified or reduced, within certain limits, to the desired tone. The most common method of toning to sepia is the following: The paper is printed to the usual tone under rather than over printing being favored. This print is then developed in the regular oxalate developer and the result is a black print. After clearing and washing the print is then placed in a bath composed of

Uranium Nitrate (10 per cent solution).....	½ oz.
Ferricyanide of Potassium (10 per cent solution).....	½ oz.
Water.....	20 oz.
Acetic Acid.....	1 dram.

This solution does not work quickly unless heated, and it is therefore advisable to place the pan containing the solution, which should be of agate ware, in another pan containing water and heated by gas or oil flame. If a water bath is not used there is danger of the prints, unless constantly stirred, settling to the bottom of the pan, when an ugly brown stain will be the result. With a cold solution it may take from one to three hours to tone the prints, while with the hot solution they will tone in from twenty to forty-five minutes. Not only can freshly made prints be toned in this way, but prints that have



From a
Platinotype

By
F. J. Howe.

An Example of Local Development with Brush and the use
of Mercury for securing Flesh Tints

been made for several months will tone equally well. Clear in a bath of acetic acid 1 dram, water 3 ounces and wash for five minutes. Another method is to prepare a developing bath consisting of

Stock Solution Oxalate (1 to 3).....	1 oz.
Glycerine.....	1 oz.
Mercury Solution (1 to 20).....	3 drams.
Water.....	2 oz.

Draw the print through this developer and allow it to develop up in the usual manner. When the tone is satisfactory clear in an acid bath 1 to 200 and wash. Should this bath produce a tone lighter in shade than desired, then the bath may be heated to 90° or 100° and the tone will rapidly darken, or it may, after being washed, be placed in the uranium bath above mentioned, when it will gradually intensify and change to a darker tone.

Another method, which produces Bartolozzi Red prints, is to immerse an under exposed print in a bath of

Ammonium Sulphocyanate.....	2 grains.
Uranium Nitrate.....	4 grains.
Ferricyanide of Potassium.....	4 grains.
Water.....	4 oz.

After toning to the desired color wash for fifteen minutes.

The following is said to produce several red tones

depending on the length of time the print is kept in the bath :

Ferricyanide of Potassium.....	6 grains
Uranium Nitrate.....	6 grains.
Sulphate of Sodium.....	6 grains.
Acetic Acid.....	3 drams.
Water.....	6 oz.

The print, which has been normally exposed, is first developed in the oxalate solution, cleared and washed, and is then placed in the solution, when it gradually changes to a sepia, then a red and then a deeper red. The print is then washed for fifteen minutes.

Greenish tones can be given to platinotypes by first toning black, then toning in the uranium bath described and without washing, take from the uranium bath and place in a glass tray containing the following bath :

Perchloride of Iron.....	25 grains.
Water.....	2 oz.

The sepia tone will gradually change to a light greenish-blue and then darker. When it has reached the desired color transfer to a 1 to 200 acid bath and wash for fifteen minutes. With this bath very beautiful effects in double toning may be secured, and it is particularly appropriate for river and lake views. The tones can be applied locally with a piece of cot-

ton or a brush to the water, leaving the balance of the picture left of a sepia tone. Should you wish to reduce the tone to a lighter shade you can readily do so by applying a weak solution of carbonate of soda and water to the parts.

A blue tone can be obtained with the same bath by first washing the black print in the perchloride of iron bath for a few minutes and without washing transfer it to a tray containing the uranium tones. The perchloride will have no visible effect upon the black print, but as soon as it is placed in the uranium bath the blue tone will appear. A very effective color for moonlight effects may be produced by developing a rather strongly printed sheet in the following:

Stock Solution Oxalate (1 to 3).....	1 oz.
Glycerine	2 oz
Ferricyanide of Potassium (10 per cent solution)....	5 dram.
Water.....	2 oz.

This developer will produce a beautiful tone if applied to the surface of the paper with a piece of cotton, but is liable to be streaky if the print is simply rocked in it. Another bath for similar effects is made up as follows:

Perchloride of Iron.....	4 grains.
Potassium Ferricyanide.....	2 grains.
Water.....	3 oz.

Dissolve the ferricyanide in two ounces of the water and the perchloride in the other ounce and then mix. To this solution add four drops of muriatic acid. This solution is to be applied to black prints and is very effective on those which have been over exposed.

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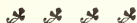
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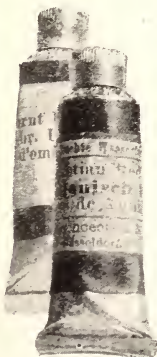
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